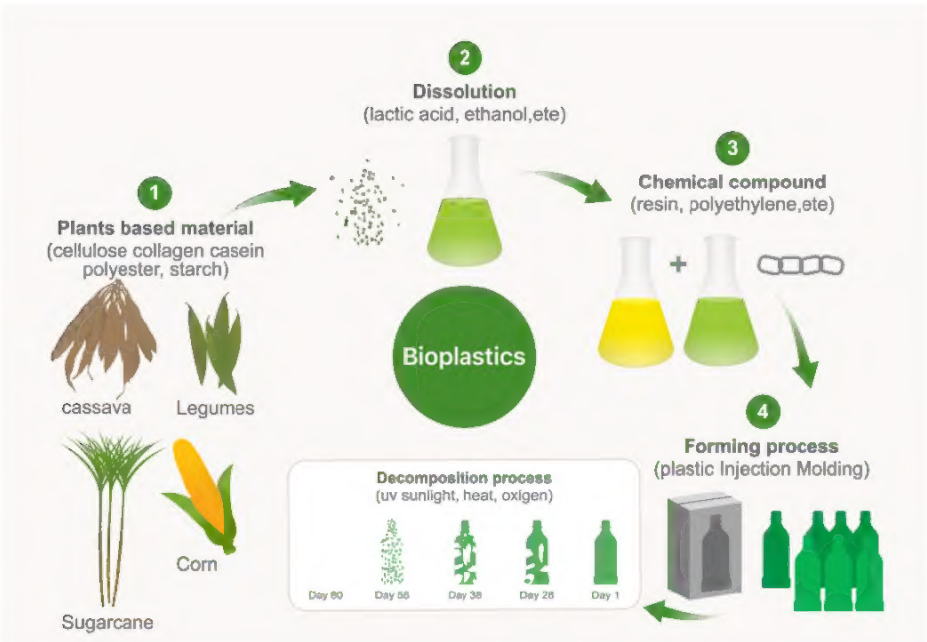
Non-oil plastic manufacturing methods

Plastic can be manufactured from non-oil sources, including other fossil fuels like natural gas and renewable biomass materials such as corn, sugarcane, and cellulose. These non-oil-based plastics are often referred to as bioplastics or bio-based plastics.

- Bioplastics (Renewable Sources):



Bioplastics are made from renewable biomass sources, which provide the necessary carbon and hydrogen building blocks (monomers).

The main sources and types include:

1. Carbohydrates:

Starches from corn, potatoes, or cassava can be processed into bioplastics. Polylactic acid (PLA) is a common bioplastic derived from fermented sugars (like dextrose from corn) and is widely used in 3D printing filament, cups, and food containers.

Cellulose: This natural polymer found in plants and wood is used in early plastics like Parkesine and modern cellulose acetate.

2. Vegetable fats and oils:

Plant-derived oils can be used to synthesize polymers like polyurethanes.

Bacteria: Certain bacteria can naturally produce polyesters, such as polyhydroxyalkanoates (PHA) and poly-3-hydroxybutyrate (PHB), when fed sugars or lipids.

3.Waste Materials:

Some bioplastics are made from agricultural waste (like banana stalks or fish skin) or even CO_2 captured from the air.

- **Other Fossil Fuel Sources:**

While not renewable, plastics are also commonly made from other fossil fuels besides crude oil, primarily natural gas and coal.

1.Natural Gas:

Ethane and propane, components of natural gas, are often the primary feedstocks for producing common plastics like polyethylene (PE) and polypropylene (PP) via steam cracking.

2.Coal:

Historically, and still in some regions (like China), coal conversion chemistry has been used to produce plastic ingredients like vinyl chloride (for PVC) and methanol, which can then be converted into olefins (ethylene and propylene).

- **Challenges:**

Although technically feasible, producing plastics from non-oil sources currently faces challenges related to cost-effectiveness and scalability. Plastics made from crude oil and natural gas are generally the cheapest options due to existing infrastructure and supply chains.

However, as technology advances and environmental concerns grow, non-oil sources are becoming a more viable and growing alternative for a wide range of applications.

By: Haytham Zeidan

https://archive.org/details/@wazefapress

Resources:

https://en.wikipedia.org/wiki/Bioplastic

https://www.bpf.co.uk/plastipedia/how-is-plastic-made.aspx

https://actionpoint.co.uk/bioplastics-and-packaging/

https://www.iosrjournals.org/iosr-jestft/papers/Vol14-Issue10/Series-3/B1410030917.pdf

https://www.biocycle.net/plastic-from-plants-not-petroleum/

https://www.eia.gov/tools/faqs/faq.php?id=34&t=6

https://plasticseurope.org/plastics-explained/

https://www.hlc-metalparts.com/news/how-plastic-materials-are-made-85145687.html

https://www.ing.be/en/business/sustainable-business/fossil-free-plastics

https://archive.org/details/How-Plastic-is-Made

https://youtu.be/6SRYnUPOyig?si=_q9EN6uZvxvE4K-b